

# Watershed Restoration Action Strategy for the Middle Wabash - Busseron Watershed

## Part II: Concerns and Recommendations



Prepared for  
**Indiana Department of Environmental Management**  
**Office of Water Quality**  
**Watershed Management Section**

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## **Part II, FOREWORD**

The Middle Wabash - Busseron Watershed Restoration Action Strategy (WRAS) is intended to be a living document designed to assist restoration and protection efforts of stakeholders in their sub-watersheds. As a "living document" information contained within the WRAS will need to be revised and updated periodically.

The WRAS is divided into two parts: Part I, Characterization and Responsibilities and Part II, Concerns and Recommendations. The first draft of the Middle Wabash - Busseron WRAS was released for public review during the spring of 2002. A 60-day public comment period followed the public meetings at which this WRAS document was introduced. This final version of the WRAS includes public comments received during the 60-day comment period. For comments to be included in the final version, they were required to be written and submitted to WHPA, Inc. (the firm contracted to produce this WRAS) during the comment period

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## **Part II, Chapter 1: Concerns and Recommendations**

Part II of the Watershed Restoration Action Strategy discusses the water quality concerns identified for the Middle Wabash - Busseron Watershed and lists recommended management strategies to address these concerns.

Part II includes:

Section 1 - Water Quality Concerns and Priority Issues Identified by Stakeholder Groups

Section 2 - Water Quality Concerns and Priority Issues Identified by State and Federal Agencies

Section 3 - Identification of Impaired Waters

Section 4 - Priority Issues and Recommended Management Strategies

Section 5 - Future Actions and Expectations

### **1. Water Quality Concerns and Priority Issues Identified by Stakeholder Groups**

The Middle Wabash - Busseron watershed contains potential stakeholder groups that have different missions (contact information is included in Appendix C). Many of these groups have a long history of working in the Middle Wabash - Busseron watershed. The following discussion briefly describes some of the watershed groups.

#### **Natural Resources Conservation Service**

The Natural Resources Conservation Service (NRCS), under the U.S. Department of Agriculture (USDA), provides leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment. The NRCS offers landowners financial, technical, and educational assistance to implement conservation practices on privately owned land. Using this help, farmers, ranchers, and forest landowners apply practices that reduce soil erosion, improve water quality, and enhance crop land, forest land, wetlands, grazing lands, and wildlife habitat. Incentives offered by USDA promote sustainable agricultural and forestry practices, which protect and conserve valuable farm and forest land for future generations. USDA assistance also helps individuals and communities restore natural resources after floods, fires, or other natural disasters.

#### **Soil and Water Conservation Districts**

Local Soil and Water Conservation Districts (SWCD) assist land users and residents in the protection and improvement of the local environment. SWCDs can provide technical and financial assistance to local watershed conservation groups.

#### **Banks of the Wabash, Inc.**

Banks of the Wabash, Inc. is a non-profit organization dedicated to preserving, enhancing and promoting the significant historical and natural resources of the Wabash River Corridor. Banks of the Wabash, Inc. brings together a variety of individuals who are interested in conservation, historic preservations, economic development, community education and heritage tourism.

#### **Four Rivers Resource Conservation & Development**

The Four Rivers RC&D serves Daviess, Dubois, Gibson, Greene, Knox, Martin, Pike, Posey, Vanderburg, and Warrick counties. Its mission is to empower the people of the Four Rivers RC&D Area in the wise enhancement of economical, cultural, and natural resources to improve their quality of life. Four Rivers, Hoosier Heartland, and Sycamore Trails RC&D's, in partnership with seventeen SWCDs, are working together to assist with water quality issues on the Eel and Lower White River Watersheds. An IDEM-319 grant provides a coordinator and cost-share for practice application under the CORE4 program. The Southwest Indiana Brine Coalition, under Four Rivers RC&D administration, has received an IDEM-319 grant for funding a coordinator position to remediate brine, which is a waste product of oil production that frequently leaks from pipes and holding ponds onto the land. Other projects include technical assistance for farmers developing waste management plans and environmental education.

## **Hoosier River Watch**

Hoosier Riverwatch is a state-sponsored water quality monitoring initiative. The program was started in 1994 to increase public awareness of water quality issues and concerns by training volunteers to monitor stream water quality. Hoosier Riverwatch collaborates with agencies and volunteers to:

- Increase public involvement in water quality issues through hands-on training of volunteers in stream monitoring and cleanup activities.
- Educate local communities about the relationship between land use and water quality.
- Provide water quality information to citizens and governmental agencies working to protect Indiana's rivers and streams.

## **Indiana Karst Conservancy**

The Indiana Karst Conservancy is a non-profit organization dedicated to the preservation and conservation of Indiana's unique karst features. The IKC was formed by concerned individuals when it was apparent that no similar group was actively protecting such features for their inherent geological, biological, and archaeological importance. The purposes of the IKC are the management, protection, and acquisition of the karst areas in Indiana. The IKC also supports research and promotes education related to karst and its appropriate use.

## **Sycamore Trails Resource Conservation and Development**

The Sycamore Trails RC&D is a non-profit organization that helps people care for, conserve, and develop natural, human, and economic resources in a way that will improve the area's environment, economy and standard of living. Sycamore Trails RC&D serves 9 counties in West Central Indiana: Clay, Fountain, Montgomery, Owen, Parke, Putnam, Sullivan, Vermillion, and Vigo. Sycamore Trails encourages good management and stewardship of forest resources, works to improve the quality and quantity of fish and wildlife habitat, and assists and educates other organizations on obtaining grant funding. They are in the final stages of organizing a new land trust committee which will accept conservation easements on private land.

## **Wabash River Heritage Corridor Commission**

The Wabash River Heritage Corridor Commission was authorized with the passage of House Enrolled Act 1382 by the 1991 Indiana General Assembly. The current applicable Indiana Code, IC 14-13-6, was amended by the 1997 General Assembly. The Wabash River Heritage Corridor Commission, representing the Wabash River Heritage Corridor, shall protect and enhance the natural, cultural, historical, and recreational resources and encourage sustainable development of the corridor. This will be accomplished by stimulating public interest, encouraging the exchange of information, and supporting the establishment of common goals and cooperative actions of people and communities within the Wabash River Heritage Corridor. Goals for the Wabash River Heritage Corridor Commission were defined in public meetings held in 1992/93, and include the following:

- To promote the improvement of the natural environment of the corridor.
- To promote the improvement of recreational opportunities in the corridor.
- To increase public awareness of the corridor as a whole.
- To encourage that recreational areas and trails are acquired and developed in the corridor without the use of eminent domain.
- To promote the development of a better environment ethic in the citizens and communities of the corridor.
- To promote better cooperation between all of the groups and individuals with an interest in the corridor.

## Part II, Chapter 2: Water Quality Concerns and Priority Issues Identified by State and Federal Agencies

This section presents the combined efforts of state and federal agencies, and universities (such as IDEM, IDNR, USDA-Natural Resources Conservation Service, Ohio River Valley Water Sanitation Commission, Purdue University, Indiana University, Indiana Geologic Survey, and US Geological Survey) to assess water quality concerns and priority issues in the Middle Wabash - Busseron Watershed. This multi-organization effort formed the basis of the Unified Watershed Assessment for Indiana. At this time, the Unified Watershed Assessment has been completed for 1998 and updated for 2000-2001.

### Indiana's Unified Watershed Assessment (UWA)

The UWA workgroup gathered a wide range of water quality data that could be used to characterize Indiana's water resources. These data were used in 'layers' in order to sort the 8-digit HUC watersheds according to the present condition of the water in lakes, rivers, and streams. The workgroup used only those data which concerned the water column, organisms living in the water, or the suitability of the water for supporting aquatic ecosystems. Each 'layer' of information/data was partitioned by percentiles into scores. The scores ranged between one and five, with a score of one indicative of good water quality or minimum impairment, and a score of five indicating heavily impacted or degraded water quality.

The data layers used in the 1998 and the 2000-2001 update include:

- Lake Fishery: Large-mouth bass community information for lakes
- Stream Fishery: Small-mouth bass community information for streams
- Aquatic Life Use Support: The "livability" of the water column for aquatic life, determined from evaluation of chemical and physical water data, and assessment of aquatic life
- Fish Consumption Advisories: Site specific advisories based on current data
- Fish Index of Biotic Integrity: Based on fish community diversity and fish health
- Qualitative Habitat Evaluation Index: Measure of whether the aquatic habitat is suitable for diverse communities, based on visual observations
- Lake Trophic Scores: Indicator for the rate at which a lake is 'aging' due to inputs of nutrients and other factors
- Sediment Potential: Indicator of potential sediment input to waterbodies in the watershed

The sources and additional information for these data layers include:

- Lake Fishery: From IDNR fisheries surveys of lakes and reservoirs from 1972 to 1994. Raw scores were averaged for all lakes in the watershed
- Stream Fishery: From IDNR fisheries surveys of streams from 1970 to 1994. Raw scores were averaged for all streams in the watershed
- Aquatic Life Use Support: IDEM, Office of Water Quality, Assessment Branch
- Fish Consumption Advisories: ISDH and IDEM, Office of Water Quality, Assessment Branch
- Fish Index of Biotic Integrity: IDEM, Office of Water Quality, Assessment Branch
- Qualitative Habitat Evaluation Index: IDEM, Office of Water Quality, Assessment Branch
- Lake Trophic Scores: Indiana Clean Lakes Program through IDEM, Office of Water Quality, Assessment Branch. This score was based on information gathered from sampling conducted in the 1970's and 1980's

During summer 1999 the UWA workgroup used additional layers of information to identify the resource concerns and stressors for each of the 361 11-digit watersheds in Indiana. Examination of the human activities that have the potential to impact the ecosystem will help planners to focus on those areas where restoration may be most critical. Organizations can identify opportunities to use their programs and resources to address those areas.

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This focusing process will illuminate areas where the interests of two or more partner agencies may converge. It is intended that this will lead to more effective allocation of resources for restoration and protection activities. At the local level, this information can assist groups to prioritize watershed activities and provide some discussion points for planning.

This amended assessment has the following benefits:

- Provides a logical process for targeting funds, which may be expanded or updated without changing the basic framework.
- Provides information at a finer resolution (11-digit hydrologic units) to agencies and local groups interested in watershed assessment.
- Identifies data gaps.
- Can be used as a compliment to other assessments, such as the 305(b) Report and 303(d) List.

Table 2-1 and Figure 2-1 show the results of the 2000-2001 UWA for the Middle Wabash - Busseron watershed (NRCS & IDEM 2000).

## **Part II, Chapter 3: Identification of Impaired Waters**

Section 303(d) of the Clean Water Act requires states to identify waters that do not or are not expected to meet applicable water quality standards with federal technology-based standards alone. States are also required to develop a priority ranking for these waters taking into account the severity of the pollution and the designated uses of the waters. Indiana's 303(d) list was approved by EPA on February 16, 1999.

Once the Section 303(d) list and ranking of waters is completed, the states are required to develop Total Maximum Daily Loads (TMDLs) for these waters in order to achieve compliance with the water quality standards. The TMDL is an allocation that determines the point and nonpoint source (plus margin of safety) load reductions required in order for the waterbody to meet water quality standards. IDEM's Office of Water Quality has and continues to perform point source waste load allocations for receiving waters. Part I of the WRAS briefly outlines IDEM's strategy for developing TMDLs.

Table 0-1 shows the Middle Wabash - Busseron Watershed waterbodies that are on Indiana's 1998 Clean Water Act Section 303(d) list submitted and approved by EPA (IDEM 1998, Figure 3-1). The 2002 draft 303(d) list has been completed and the final list will be released in October 2002. The draft 2002 list is not included in this document, but is available from IDEM's Office of Water Quality (<http://www.state.in.us/idem/water/planbr/wqs/303d.html>)



## Part II, Chapter 4: Priority Issues and Recommended Management Strategies

Part I provided the existing water quality information for the Middle Wabash - Busseron Watershed and Part II lists priority issues and concerns from local, state, and federal stakeholders in the watershed. This section pulls together the priority issues and concerns held by all stakeholders and recommends management strategies. Underlying all discussions of priority issues and concerns is the fact that improving water quality in the Middle Wabash - Busseron Watershed will also enhance the natural and recreational values of the Wabash River and Busseron Creek. Each subsection below focuses on a single priority issue.

### 4.1 Data/Information and Targeting

The success in restoring water quality in the Middle Wabash - Busseron Watershed is fundamentally based on identifying the specific geographic problem areas; identifying all sources contributing to the impairment of the waterbody; and quantifying the contribution of a pollutant by each source.

**Recommended Management Strategy 1:** Numerous data collection efforts are ongoing in the Middle Wabash - Busseron Watershed. This information should be used in prioritizing and targeting specific problems and geographic areas in the watershed. The scale at which targeting and prioritization should occur is the 14-digit HUC watershed area (Figure 2-2 of Part I). Targeting and prioritization will require input from stakeholders living in those geographic areas. The purpose of prioritization and targeting is to enhance allocation of resources in the effort of improving water quality.

**Recommended Management Strategy 2:** Through the development of Total Maximum Daily Loads (TMDLs) for impaired waterbodies in the Middle Wabash - Busseron Watershed, all sources contributing to the impairment of a waterbody will be identified and quantified in terms of their contribution to the waterbody. This includes gathering more data and information on nonpoint sources of water pollution. Throughout the TMDL process, information and feedback from watershed stakeholders will be required in order to generate appropriate allocation scenarios. The result of developing TMDLs will be an understanding of the impact of nonpoint sources on water quality in the watershed.

### 4.2 Streambank Erosion and Stabilization

The cutting and erosion of streambanks within the Middle Wabash - Busseron Watershed is a major concern. This cutting and erosion increases the sediment load in waterbodies and directly impacts the scenic and recreational values of waterbodies in the Middle Wabash - Busseron Watershed. Streambank cutting and erosion is often a function of many factors that include stream energy and velocity, flooding, and land management. Increased drainage in headwater streams and ditches increases stream energy during rainfall events and often leads to increased streambank cutting and erosion downstream. Land clearing and urban development also impact volume and velocity of runoff. Hence, this problem is not easily solved.

**Recommended Management Strategy 1:** Structural stabilization of specific streambank areas in the Middle Wabash - Busseron watershed may solve problems on a temporary basis. However, a comprehensive understanding of drainage, stream flows and energies, and land management practices is required to adequately approach this problem. Conservation partners (local, state, and federal) are actively working within their specific geographic areas (typically at the county level); however, this may not facilitate solving the streambank cutting and erosion problems because efforts may not be coordinated between headwater and downstream areas. For example, drainage should take into account the work and efforts of downstream partners to reduce flooding and streambank cutting. Conservation efforts should be in the context of watersheds and span county boundaries in order to account for downstream impacts. Local Drainage Boards, Planning and Zoning Boards, and County Commissioners could effectively address this issue by involving local stakeholders in the decision making process and approaching the issue on a watershed basis.

### 4.3 Failing Septic Systems and Straight Pipe Discharges

Local county health departments and other stakeholders have identified failing septic systems and straight pipe discharge from septic tanks as significant sources of water pollution in the Middle Wabash - Busseron watershed. Straight pipe discharges from septic tanks and septic tanks connected to drainage tiles are illegal (327 IAC 5-1-1.5); however, these practices still exist in the Middle Wabash - Busseron watershed.

**Recommended Management Strategy 1:** The direct impact of communities discharging their septic tank effluent to waterbodies needs to be adequately characterized. This will involve coordination between the Office of Water Quality, local health

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departments, Indiana State Department of Health, and other stakeholders. The choice to eliminate the illegal discharges will be a cooperative effort between homeowners and local, state, and federal stakeholders.

**Recommended Management Strategy 2:** Local planning, zoning, and health ordinances could be adopted or strengthened to address this problem during new development. Existing local ordinances could be enforced more vigorously to correct problems with existing systems. Both of these strategies will require input from local stakeholders.

**Recommended Management Strategy 3:** An education/outreach program on the health and environmental risks of septic system discharges, system maintenance, and system function would provide homeowners and others with basic information to better understand the impacts of inadequate systems. This kind of education effort would involve local health departments, Indiana State Department of Health, IDEM, and other stakeholders. For example, the Arrowhead Country RC&D in northwest Indiana is working on a project to demonstrate proper septic system installation.

### 4.4 Water Quality - General

The Clean Water Act Section 303(d) list presented in Chapter 3 lists impaired waterbodies for the Middle Wabash - Busseron watershed.

**Recommended Management Strategy:** The Clean Water Act requires states to complete TMDLs for waterbodies listed on the Section 303(d) list. The Office of Water Quality is currently evaluating and exploring the modeling process and data needs required to complete TMDLs for the Section 303(d) listed waterbodies. Completion of a TMDL will involve loading allocations of a pollutant to both point and nonpoint sources. The development of TMDLs will involve meetings with stakeholder groups linked to the Section 303(d) waterbodies. As TMDLs are developed, this Watershed Restoration Action Strategy will be amended to incorporate the final TMDLs.

### 4.5 Fish Consumption Advisories

As noted in Part I and Part II, fish consumption advisories are concerns within the Middle Wabash - Busseron watershed.

**Recommended Management Strategy 1:** In many cases, the source of the contamination is unknown and may be from atmospheric deposition or some unknown discharge. To address this concern, the cause or source must be identified. Until that is accomplished, the fish consumption advisories should be followed.

### 4.6 Nonpoint Source Pollution - General

Nonpoint source pollution contributions are often difficult to assess or quantify. They can include sediment deposition from soil erosion, nutrient runoff from animal wastes and commercial fertilizer, herbicide and insecticide runoff, and oil or fuel waste runoff. Degraded wetlands may also contribute to nonpoint source pollution, as their capacity for abatement of runoff and the associated pollutants is diminished or lost. Nonpoint pollution can emanate from agricultural as well as urban lands. Currently, loadings of nonpoint source pollutants to water are often inferred by examination of land use practices, without actual measurements. In addition, the actual water quality impairments related to nonpoint source pollutants have not been well characterized in the Middle Wabash - Busseron watershed. Finally, very few regulatory control mechanisms exist to control nonpoint source pollution.

**Recommended Management Strategy 1:** Through the TMDL development process, the Office of Water Quality will identify, assess, and quantify nonpoint source pollutant loadings to impaired waterbodies. In order to accomplish this task, the Office of Water Quality will work closely with local, state, and federal stakeholders at the watershed and subwatershed level. Loading scenarios for nonpoint source pollutants will be developed by the Office of Water Quality and reviewed by local, state, and federal stakeholders. Implementation of nonpoint source controls will involve a blend of funding assistance and regulatory action, where applicable.

**Recommended Management Strategy 2:** Numerous funding mechanisms, such as Conservation Reserve Program, Environmental Quality Incentive Program, Lake and River Enhancement program, and 319(h) grants, exist to promote practices to reduce nonpoint source pollution in the watershed. To more efficiently and effectively address nonpoint source pollution in the watershed, the prioritization and targeting discussed previously in Part II should be used to allocate further application of resources.

**Recommended Management Strategy 3:** The management of urban nonpoint sources can be addressed through effective land use planning and site design. Designs that incorporate less impervious area and more natural infiltration areas have proven effective in reducing urban nonpoint pollution. Local stakeholders working with local planning and zoning authorities, and developers, should implement more stringent site design requirements to reduce nonpoint source contaminants. This effort would be supported by the state and federal stakeholders.

**Recommended Management Strategy 4:** Practicing the following management measures for NPS pollution abatement may significantly reduce the sediment, nutrient, pesticide and other pollutant contributions to surface waters:

- 1) Protection of Wetlands and Riparian Areas of those serving a significant NPS pollution abatement function
- 2) Restoration of Wetlands and Riparian Areas of preexisting functions in damaged and destroyed areas, esp. where the systems will serve significant NPS pollution abatement function
- 3) Vegetated Treatment Systems (VTS) to promote use of constructed wetlands and vegetated filter strips where these systems will serve significant NPS pollution abatement function

\*The information on degraded wetlands as potential contributors to nonpoint source pollution and the management measures for NPS pollution abatement is compiled from the USEPA Draft Guidance entitled "National Management Measures to Protect and Restore Wetlands and Riparian Areas for the Abatement of Nonpoint Source Pollution" (EPA 841-B-01-001 June 2001).

#### **4.6.1 Nonpoint Source Pollution- Education and Outreach**

This Watershed Restoration Action Strategy is a beginning point for education and outreach efforts. It compiles existing knowledge about the water resources in this watershed and presents it to the stakeholders who live in the Middle Wabash - Busseron watershed. It brings to a public forum the available information and local concerns. However, the education process does not stop with the publication of this document.

**Recommended Management Strategy:** Local stakeholders, in cooperation with state and federal agencies, need to seek additional information on water quality concerns and issues addressed in this document and make that information available to the public. Additionally, the problems associated with septic failures, soil erosion, land use issues, and riparian zones can be emphasized through meetings, training sessions, and stakeholder group discussions. Field days are excellent ways to present information and encourage discussion. Use of experts with strong background knowledge coupled with local sponsors is an effective method to convey solutions to these problems.

### **4.7 Point Sources - General**

There are 158 active NPDES permitted dischargers, and 15 CSO discharge points in the Middle Wabash - Busseron watershed. Additionally there are illegal point source discharges, such as tiles discharging septic tank effluent that exist in the watershed.

**Recommended Management Strategy:** The Permitting and Compliance Branch of the Office of Water Quality is responsible for issuing and monitoring compliance of NPDES permit holders. Clearly, more emphasis and resources are needed to identify and correct illegal point sources and noncomplying point sources. Improving compliance of NPDES dischargers and identifying illegal dischargers will involve fostering a working relationship with other local, state, and federal stakeholders to monitor compliance and report unusual discharges or stream appearance. In regards to illegal discharges, the Office of Water Quality will work with local, state, and federal stakeholders to identify and eliminate these sources of water pollution.

## **Part II, Chapter 5: Future Expectations and Actions**

As discussed in Part I, this Watershed Restoration Action Strategy is intended to be a fluid document that will be revised or amended as new information becomes available. Section 5.1 discusses expectations derived from the Strategy and how progress will be measured. Specific revisions and amendments to the Watershed Restoration Action Strategy are discussed in Section 5.2. Finally, the Watershed Restoration Action Strategy will be reviewed by all stakeholders before it becomes final, as described in Section 5.3.

### **5.1 Expectations and Measuring Progress**

The Middle Wabash - Busseron Strategy provides a starting point to address water quality concerns held by local, state, and federal stakeholders. Part II provides recommended management strategies to address these concerns. Through cooperative efforts with stakeholders, all of the recommended management strategies listed will begin implementation by the summer of 2003.

Measurement of progress is critical to the success of any plan. Water quality improvements will not take place overnight. Measuring of progress in terms of water quality will be provided through the Office of Water Quality Assessment Branch's rotating basin monitoring strategy.

## 5.2 Expected Revisions and Amendments

This Watershed Restoration Action Strategy is intended to provide a starting point to improve water quality and measure the improvement. Hence, this document will require revisions and amendments as new information becomes available. The future revisions and amendments have been divided into those that are expected within the next year (Section 5.2.1) and those that will occur over a long-term basis (Section 5.2.2).

### 5.2.1 Short Term Revisions and Amendments

The most significant revisions and amendments will likely occur during 2002 and after, as a result of stakeholder review.

### 5.2.2 Long Term Revisions and Amendments

The Office of Water Quality is moving toward adopting a watershed management approach to solve water quality problems. Part of the watershed approach is the use of a rotating basin management cycle. The Assessment Branch of the Office of Water Quality has already adopted this rotating basin cycle in its intensive monitoring and assessment of Indiana waterbodies (this is in addition to the already established fixed station monitoring which occurs on a monthly basis). The Watershed Restoration Action Strategy may be revised or amended when sufficient information becomes available.

## 5.3 Review of the Watershed Restoration Action Strategy

Before this Watershed Restoration Action Strategy becomes final, it will undergo rigorous review. The first stage of review will be performed internally by the Office of Water Quality. Once the Watershed Restoration Action Strategy has been revised to address internal Office of Water Quality comments, it will be circulated to local, state, and federal stakeholders in the watershed. Written comments from local, state, and federal stakeholders will be addressed and the Watershed Restoration Action Strategy will again be revised to incorporate applicable comments. Once internal and external comments have been addressed, the final version of the Watershed Restoration Action Strategy will be released.

## Part II Tables

**TABLE 2-1: UNIFIED WATERSHED ASSESSMENT FOR THE MIDDLE WABASH-BUSSERON WATERSHED, 2000-2001**

Hydrologic Unit Scores for Each Parameter Used in the Unified Watershed Assessment [2000-2001]															
	Measured Parameters														
11 Digit Hydrologic Unit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
05120111010	nd	nd	nd	nd	nd	nd	nd	1	5	1	1	2	3	3	2
05120111020	nd	nd	nd	nd	nd	nd	nd	2	5	1	4	2	2	3	4
05120111030	nd	nd	nd	2	nd	nd	4	3	4	1	4	2	2	2	3
05120111040	2	nd	nd	nd	nd	nd	nd	2	3	1	4	3	2	2	3
05120111050	2	nd	nd	nd	nd	nd	2	3	3	1	5	3	2	2	2
05120111060	nd	nd	nd	nd	nd	nd	3	2	3	1	4	2	2	2	4
05120111070	2	nd	nd	nd	nd	nd	3	2	3	1	5	2	2	2	3
05120111090	nd	nd	nd	nd	nd	nd	nd	3	1	1	3	1	2	2	3
05120111100	1	nd	nd	nd	nd	nd	nd	3	2	1	3	2	2	2	3
05120111120	1	nd	nd	nd	nd	nd	nd	2	1	1	1	2	1	3	3
05120111130	nd	nd	nd	nd	nd	nd	nd	2	4	1	1	2	2	3	3
05120111150	1	nd	nd	nd	nd	nd	3	3	3	1	1	2	1	3	3
05120111160	nd	nd	nd	nd	3	nd	3	3	4	1	2	2	2	3	4
05120111170	nd	nd	nd	nd	nd	nd	nd	2	1	1	2	2	3	4	3
05120111180	2	nd	nd	nd	nd	nd	nd	2	1	1	3	2	3	5	3

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05120111190	2	nd	nd	nd	nd	nd	nd	3	3	1	2	2	3	4	3
05120111200	2	nd	nd	nd	nd	nd	nd	2	3	1	3	2	3	5	3

### KEY

#### *Parameters:*

- 1 - Mussel Diversity and Occurrence
- 2 - Aquatic Life Use Support
- 3 - Recreational Use Attainment
- 4 - Stream Fishery
- 5 - Lake Fishery
- 6 - Eurasian Milfoil Infestation Status
- 7 - Lake Trophic Status
- 8 - Critical Biodiversity Resource
- 9 - Aquifer Vulnerability
- 10 - Population Using Surface Water for Drinking Water
- 11 - Residential Septic System Density
- 12 - Degree of Urbanization
- 13 - Density of Livestock
- 14 - % Cropland
- 15 - Mineral Extraction Activities

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Score range:

1 = good water quality (minimum impairment)

5 = heavily impacted or degraded water quality

nd = no data

(from NRCS & IDEM 2000)

**TABLE 0-1: WATERS OF THE MIDDLE WABASH-BUSSERON ON INDIANA'S 1998 303(D) LIST**

ID	Waterbody	Parameter of Concern	Priority for TMDL development
ILBF22_BF 01-1998	SUGAR CR	METALS NUTRIENTS NONPRIORITY ORGANICS SALINITY/TDS/CHLORIDES PATHOGENS SUSPENDED SOLIDS	131
ILBF22_BF 11-1998	SUGAR CR	PESTICIDES METALS PRIORITY ORGANICS NONPRIORITY ORGANICS NUTRIENTS SALINITY/TDS/CHLORIDES PATHOGENS SUSPENDED SOLIDS	131
ILBFC10_BFC 10-1998	ROBINSON CR	PESTICIDES METALS PRIORITY ORGANICS NUTRIENTS	189
ILBFC10_BFC 11-1998	ROBINSON CR	PESTICIDES METALS PRIORITY ORGANICS NONPRIORITY ORGANICS NUTRIENTS	189
ILBFC10_BFC 19-1998	ROBINSON CR	PESTICIDES CHLORINE PRIORITY ORGANICS METALS NUTRIENTS	189
ILBFC10_BFC 20-1998	ROBINSON CR	UNKNOWN PESTICIDES PRIORITY ORGANICS NONPRIORITY ORGANICS	189
ILBFC10_BFC 25-1998	ROBINSON CR	PESTICIDES PRIORITY ORGANICS NONPRIORITY ORGANICS METALS NUTRIENTS	189
ILBFC10_BFC 26-1998	ROBINSON CR	PESTICIDES PRIORITY ORGANICS NONPRIORITY ORGANICS METALS NUTRIENTS	189

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ID	Waterbody	Parameter of Concern	Priority for TMDL development
ILBFCA21_BFCA22-1998	MARATHON CR	PESTICIDES PRIORITY ORGANICS NONPRIORITY ORGANICS METALS	330
ILBFCB12_BFCB12-1998	QUAIL CR	PESTICIDES PRIORITY ORGANICS NONPRIORITY ORGANICS	176
ILBM02_BM C2-1998	SUGAR CR	NUTRIENTS SILTATION ORGANIC ENRICHMENT/LOW DISSOLVED OXYGEN FLOW ALTERATIONS	103
ILRBL-1998	PARIS TWIN EAST	PESTICIDES NUTRIENTS SILTATION ORGANIC ENRICHMENT/LOW DISSOLVED OXYGEN TASTE AND ODOR SUSPENDED SOLIDS NOXIOUS AQUATIC PLANTS	103
ILRBW-1998	MILL CREEK POND	METALS NUTRIENTS SILTATION ORGANIC ENRICHMENT/LOW DISSOLVED OXYGEN NOXIOUS AQUATIC PLANTS	178
ILRBX-1998	PARIS TWIN WEST	PESTICIDES NUTRIENTS SILTATION ORGANIC ENRICHMENT/LOW DISSOLVED OXYGEN TASTE AND ODOR SUSPENDED SOLIDS NOXIOUS AQUATIC PLANTS	103
IN-0066FCPCB-1998	DUGGER LAKE	FCA - PCBS	2009-2011
IN-0081FCMRC-1998	OTTER CREEK	FCA - MERCURY	2009-2011
IN-0081FCPCB-1998	OTTER CREEK	FCA - PCBS	2009-2011
IN-0086BIOTA-1998	SUGAR CREEK	IMPAIRED BIOTIC COMMUNITIES	2004-2006
IN-0089BIOTA-1998	SULPHUR CREEK	IMPAIRED BIOTIC COMMUNITIES	2004-2006
IN-0093FCMRC-1998	WABASH RIVER	FCA - MERCURY	2009-2011
IN-0093FCPCB-1998	WABASH RIVER	FCA - PCBS	2009-2011

FCA - Fish Consumption Advisory

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PCB - Polychlorinated Biphenyls

Hg - Mercury

\*\*\*Only waters for which fish tissue data support issuance of fish consumption advisories are individually cited above. The Indiana Department of Health has issued a general fish consumption advisory for all other waters of the state. This advisory was based on extrapolation of the fish tissue data that were available and generally recommends that if no site-specific advisory is in place for a waterbody, the public should eat no more than one meal (8 oz.) per week of fish caught in these waters. Women of child bearing age, women who are breast feeding, and children up to 15 years of age should eat no more than one meal per month. The basis for this general advisory is widespread occurrence of mercury or PCBs (or both) in most fish sampled throughout the state. Please refer to the most recent Fish Consumption Advisory booklet available through the Indiana Department of Health (317/233-7808). Sources of the mercury and PCBs are unknown for the most part, but it is suspected that they result from air deposition.